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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 504,923	02/16/2000	Masamichi Harada	000155	6691

23850 7590 08/13/2002

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EXAMINER

BEREZNY, NEAL

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 08/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/504,923

Applicant(s)

HARADA

Examiner

Neal Berezny

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extension of time may be requested pursuant to provisions of 37 CFR 1.136(a) and 1.136(b), but not later than the expiration of the shortened statutory period.
- If the period for reply is extended at a time less than thirty (30) days prior to the expiration of the shortened statutory period, the period for reply shall be extended by the same number of days.
- Failure to reply within the shortened period for reply will result in the application being deemed abandoned (35 U.S.C. 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 30 May 2002.
- 2a) ☐ This action is FINAL.
- 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-17 is/are pending in the application.
 - 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-8 and 11-17 is/are rejected.
- 7) ☐ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 16 February 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some * c) ☐ None of:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

1. Examiner acknowledges applicant's submission a English translation of the relevant sections German Patent DE 3522427, satisfying examiner's request under 37 CFR 1.105.

Claim Objections

2. Claim 8 is objected to because of the following informalities: Improper form because the preamble is not clearly established. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3 and 13 recites the limitation "said feedstock gas", and "auxiliary reductive gas", and "said reductive nitrogen-containing gas" in both claims 3 and 13. There is insufficient antecedent basis for this limitation in the claim. Note that the use of the words "further comprises" denotes a second introduction of gases, which therefore should be distinguished from the first introduction of gases, and therefore the second set of gases lacks antecedent basis.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-5 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Lu (EP 0 840 363 A1). Lu places a substrate in a vacuum, fig.1, el.101, introduces a feedstock gas having a metal gas and a reductive nitrogen gas, el.103, forming a metal nitride layer, col.3, ln.13-20, introducing an auxiliary reactive gas, col.3 ln.23, and 55, with the feed gas, col.3, ln.1-5, and without the feed gas, col.3, ln.52, wherein the flow rate of nitrogen gas is greater than that of the metal gas, col.4, ln.29-30, and the flow of the auxiliary gas is greater than, but less than 10 times the flow nitrogen gas, col.4, ln.30-31, and an auxiliary flow greater than but less than 15 times the metal gas flow, col.6, ln.22-24. Further, Lu also teaches treating the exposed surface of the substrate with hydrogen plasma and a plasma selected from argon, nitrogen, and helium gases, el.102.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu (EP 0 840 363 A1) as applied to claims 1-5 and 8 above. Lu also teaches using an auxiliary gas comprising Si, col.3, lines 44-46, with the feedstock gas. Lu also teaches

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the prior art of using NH_3 gas, col.1, lines 23-30, col.2, lines 46-50. Lu does not specifically teach the use of NH_3 gas in Lu's process. Lu anticipated the use of NH_3 but elected not to in order to reduce particulate formation. It would be obvious to one of ordinary skill in the art at the time of the invention to use NH_3 as the reductive nitrogen gas if one had an application willing to tolerate or even preferred particulates, such as for roughening the surface of a capacitor plate to increase the surface of the capacitor.

9. Claims 6-7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu as applied to claims 1-5, 8, and 11-16 above, and further in view of Akahori (EP 0 536 664 A1). Lu teaches nitrogen gas flows higher than those claimed by applicant, col.3, ln.20-29. Further, Lu does not teach the use of a diluent gas containing oxygen and at pressures lower than applicant, col.3, ln.20-29. Akahori teaches the use of a plasma ashing containing oxygen plasma while forming a metal nitride layer, p.7, ln.53-55. It would be obvious to one of ordinary skill in the art at the time of the invention to combine Akahori with Lu to include an ashing plasma containing a diluent gas containing oxygen, in order to clean and remove organic residues on the surface of the wafer than can contaminate the metal nitride layer increasing resistivity and the probability of defects.

10. Akahori also teaches using pressures lower than that claimed by applicant, p.7, ln.53-55. It would be obvious to select a pressure range between the teachings of Lu and Akahori in order to obtain material properties between Lu and Akahori, such as

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faster throughput than in the high vacuum system and better step coverage than the low vacuum system.

11. Lu also teaches that the nitrogen levels in the reaction affect the amount of nitrogen in the metal nitride. It would be obvious to lower the nitrogen flow rate to reduce the amount of nitrogen in the metal nitride in order to increase the conductivity of the metal nitride layer thereby increasing the speed of the device and reducing the device's power consumption.

Response to Arguments

12. Applicant's arguments filed 5/30/02 have been fully considered but they are not persuasive. Applicant traverses examiner's 102 and 103 rejections based on the grounds that the prior art of record teaches a process employing a PECVD process, whereas applicant's invention teaches a heat CVD process. Applicant is reminded that the preamble of the claims carries no patentable weight, unless the body of the claims refers back to the preamble. Therefore, in response to applicant's arguments, the recitation "by the heat CVD method" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand

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alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

CONCLUSION

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

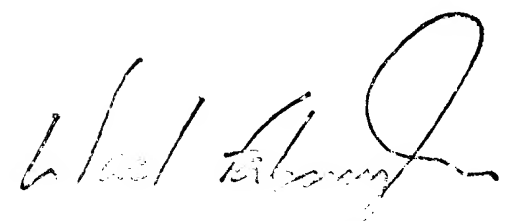
14. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

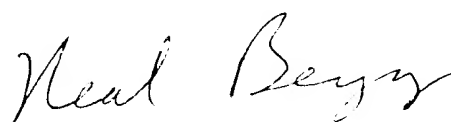
15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neal Berezny whose telephone number is (703) 305-1481. The examiner can normally be reached on Monday to Friday from 9:00 to 5:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached at (703) 308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


SUPERVISOR
TECHNOLOGY CENTER 2000


8-10-02

Neal Berezny

Patent Examiner

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